

ABSTRACT

A method of plasma-processing a silicon-based substrate provides a mirror-like etched surface of the substrate. A silicon wafer having a protective tape affixed to a circuit-formed side of the wafer is mounted on a mounting unit disposed within a process chamber of a plasma processing apparatus while the protective tape contacts on the mounting unit. The surface of the silicon wafer is kept at a temperature of 40°C or above when the surface of the substrate is etched by plasma generated by plasma discharge in plasma-generating gas including fluorine-containing gas fed into the process chamber. This suppressing adhesion and accumulation of a reaction product of the fluorine-containing gas with respect to the surface to be etched, and consequently, provides the surface with uniform etching.